Patent claims

1. A multiblock copolymer containing the structural unit of formula I

$$-A-O-R^1-O-CO-(R^2-CO-)_m-X-D-X-(CO-R^2)_m-CO-X- \quad (I),$$

where A is a radical derived from a homo- or copolyoxymethylene,
R^1 is an alkylene radical having at least two carbon atoms, or a cycloalkylene radical,
R^2 is a direct carbon-carbon bond, or an alkylene, cycloalkylene, arylene, or aralkylene radical,
X is selected from -O-, -S-, or -NH-,
D is a divalent radical B which is a radical of a hydroxy-terminated, mercaptan-terminated, or amino-terminated polymer which derives from polyalkylene glycols, from polyvinyl ethers, from polyvinyl ether copolymers with alkenes, from polyvinyl esters, from polyvinyl ester copolymers with alkenes, from polyvinyl alcohols, or from polyvinyl alcohol-alkene copolymers, from polyvinylaromatics, from polyacrylates, from polymethacrylates, from polyacetals which have no, or up to 50 mol% of, oxymethylene units, from polycarbonates, from polyesters, from polyamides, from polyimines, from polyetherester elastomers (PEEs), from polyetheramide elastomers (PEAs), from polyalkadienes which may, where appropriate, have been hydrogenated, from polyurethanes, from polyureas, or from polysiloxanes, or is a hydroxy-terminated triblock copolymer radical -PAO-B-PAO-, where B assumes one of the above meanings and PAO is a polyalkylene oxide radical, and
m is 0 or 1.

2. The multiblock copolymer as claimed in claim 1, wherein m is 0.

3. The multiblock copolymer as claimed in claim 1, wherein R^1 is a radical of the formula $-C_nH_{2n}-$, where n is a whole number from 2 to 6.

4. The multiblock copolymer as claimed in claim 3, wherein R^1 is $-CH_2-CH_2-$.

5. The multiblock copolymer as claimed in claim 1, wherein the polyoxymethylene radical A has from 99.9 to 90 mol% of repeat structural units of the formula $-(CH_2-O-)_x$, where x is a whole number from 100 to 10 000, and from 0.1 to 10 mol% of repeat structural units which derive from ethylene oxide, from propylene 1,2-oxide, from butylene 1,2-oxide, from butylene 1,3-oxide, from 1,3-dioxane, from 1,3-dioxolane, or from 1,3-dioxepan, from 1,3,6-trioxocane, and/or from linear oligo- or polyacetals, and/or from aldehydes, and/or from cyclic acetals.

6. The multiblock copolymer as claimed in claim 1, wherein the polyoxymethylene radical A has from 99.9 to 90 mol% of repeat structural units of the formula $-(CH_2-O-)_x$, where x is a whole number from 100 to 10 000, and from 0.1 to 10 mol% of repeat structural units of the formula

$$-(CH_2-CH_2-O-)_z$$

where z is a whole number which is at least 1.

7. The multiblock copolymer as claimed in claim 1, wherein X is -O-.

8. The multiblock copolymer as claimed in claim 1, wherein D is the radical of a hydroxy-terminated polymer which is selected from the group consisting of polyethers, polyalkadienes, polyesters, polyetheresters, polysiloxanes, polyetheramides, polyurethanes, or of triblock copolymers derived from non-hydrogenated or hydrogenated polyalkadiene which has been linked at both ends to a poly(alkylene oxide) block.

9. The multiblock copolymer as claimed in claim 10, wherein D is the radical of a hydroxy-terminated non-hydrogenated or hydrogenated polybutadiene, or of a hydroxy-terminated polyalkylene glycol.

10. The multiblock copolymer as claimed in claim 10, wherein D is a radical $-(C_rH_{2r}-O-)_o$, r is a whole number from 2 to 12, and o is a

whole number from 6 to 25 000, preferably from 20 to 1 000, where r may vary within the various repeat units within the scope of the stated definition, so that varying units are present in a random sequence or as blocks.

11. The multiblock copolymer as claimed in claim 1, wherein D is a radical $-(CH_2-CHR^7)_q-$, which, where appropriate, also contains co-units derived from alkenes, in particular from ethylene or propylene, where R^7 is a group $-O-R^8$ or $-O-CO-R^8$, R^8 is hydrogen or an alkyl, cycloalkyl, aryl, or aralkyl radical, in particular a methyl or ethyl radical, and q is a whole number from 2 to 5 000, where some of the radicals R^7 may also be -O- bonded to further blocks A.

12. The multiblock copolymer as claimed in claim 1, wherein D derives from hydroxy-terminated aliphatic polyesters or from hydroxy-terminated aliphatic/cycloaliphatic polyesters, or from hydroxy-terminated aromatic polyesters.

13. The multiblock copolymer as claimed in claim 1, wherein the structural elements of the formula $-X-CO-(R^2-CO-)_m-X-$ derive from chain-linking agents which are selected from the group consisting of derivatives of carbonic acid, in particular esters thereof, or from activated urea derivatives, or from esters or half-esters of dicarboxylic acids, or from dianhydrides or diimides of tetracarboxylic acids, or from mixtures of two or more of these compounds.

14. The multiblock copolymer as claimed in claim 14, wherein the structural elements of the formula $-X-CO-(R^2-CO-)_m-X-$ derives from diesters of carbonic acid, in particular from dimethyl or diphenyl carbonate.

15. The multiblock copolymer as claimed in claim 14, wherein the structural elements of the formula $-X-CO-(R^2-CO-)_m-X-$ derive from diesters of oxalic acid, of the aromatic dicarboxylic acids, and/or of the aliphatic dicarboxylic acids.

16. The multiblock copolymer as claimed in claim 16, wherein the structural elements of the formula -X-CO-(R^2-CO-)$_m$-X- derive from dimethyl esters or diphenyl esters of oxalic acid, of isophthalic acid, of phthalic acid, of adipic acid, or of sebacic acid.

17. The multiblock copolymer as claimed in claim 14, wherein the structural elements of the formula -X-CO-(R^2-CO-)$_m$-X- derive from oxybis(phthalic anhydride).

18. The multiblock copolymer as claimed in claim 14, wherein the structural elements of the formula -X-CO-(R^2-CO-)$_m$-X- derive from carbonyl N,N'-bis(caprolactamate).

19. A process for preparing multiblock copolymers encompassing the reaction of homo- or copolyoxymethylenes of the formula II with homo- or copolymers of the formula III, and with at least one chain-linking agent of the formula IV

R^4-A-O-R^1-OH (II), HX-D-XH (III), R^9-CO-(R^2-CO)-)$_m$-R^{10} (IV),

where A, R^1, R^2, X, D, and m assume one of the meanings defined in claim 1,
R^4 is a radical of the formulae -OH, -O-R^5, -O-CO-R^6, or in particular -O-R^1-OH, where R^1 has one of the meanings defined in claim 1,
R^5 is an alkyl, cycloalkyl, aryl, or aralkyl radical,
R^6 is hydrogen or an alkyl, cycloalkyl, aryl, or aralkyl radical, and
R^9 and R^{10}, independently of one another, are alkoxy, cycloalkoxy, aryloxy, aralkyloxy, or a lactam radical bonded by way of the nitrogen atom, or where, in the case where m = 1, R^9 and/or R^{10} together with another carboxylic acid group of the radical R^2 form an anhydride or imide group.

20. The process as claimed in claim 20, wherein the reaction takes place in the presence of a catalyst which is a Lewis acid or is a Lewis base.

21. The process as claimed in claim 20, wherein the catalyst used comprises the alkali metal or alkaline earth metal salts of acetylacetonates, in particular lithium acetylacetonate or sodium acetylacetonate, and/or alkali metal alkoxides or alkali metal phenoxides, in particular sodium methoxide, sodium ethoxide or lithium methoxide, and/or lithium halides, in particular lithium chloride.

22. The process as claimed in claim 20, wherein the reaction takes place at temperatures of from 100 to 240°C, preferably from 150 to 220°C, and the reaction time is from 0.5 to 60 minutes.

23. The process as claimed in claim 20, wherein the amount used of compounds of the formulae II and III, per mole of chain-linking agents of the formula IV, is such that the content of the entirety of the end groups -O-R^1-OH and -XH present at the start of the chain-linking process is in the range from one quarter of one mol to four mol.

24. The process as claimed in claim 20, wherein the reaction takes place at temperatures such that the reaction mixture is liquid, or such that a liquid phase forms in the reaction mixture.

25. The process as claimed in claim 20, wherein, from a mixture of compounds of the formulae II, III and IV, where appropriate with a catalyst, and, where appropriate, from other additives, a molded structure is produced and is heated in a stream of gas and/or in a vacuum for a period such that the desired molecular weight increase has been achieved, the temperature selected being such that the reaction mixture is solid.

26. The use of the multiblock copolymers as claimed in claim 1 as compatibilizers in compositions comprising homo- and/or copolyoxymethylenes.

27. The use of the multiblock copolymers as claimed in claim 1 as impact modifiers in compositions comprising homo- and/or copolyoxymethylenes.

28. A composition comprising homo- and/or copolyoxymethylenes and multiblock copolymers as claimed in claim 1.

29. The use of the multiblock copolymers as claimed in claim 1 for producing moldings, in particular for producing fibers, films, pipes, rods, or profiles.